

Content of semester homework

Steps of elaboration of data model in the chosen topic:

Please consider the follows:

- Position of the topic in its environment, limitations of the functions to be performed (who, for what and where will use the database management system).
- Identify the entity types involved into the model and their attributes
 - Take into account the follows:
 - what are the outputs (results) from the user's perspective
 - which input data are necessary to produce the outputs, (which data are the sources of the needed information).
- Create the 3NF database structure from the attributes of the entity types.
- Formulate 'questions' being basis of data process; think through steps of use, sorting options, searching, selection, processing, calculations and statistics.

Bear in mind, for answers mandatory data should be available, while needless, disturbing, unnecessary data should be avoided. These steps are resulted in the conceptual, logical model and the preparation of physical model.

Obligatory parts of the assignment to be submitted:

1. Conceptual data model (minimum 2 pages)
 - aim of the register model, limitations
 - operational members of the register system (system elements)
 - activities of system elements regarding register
2. Logical data model: relational data model
 - identify entity types and their attributes
 - data tables in 3NF, created from the attributes of entities (with column name, type and length)
 - explanation data content of the fields (where it is not entirely clear)
 - relations of the tables, types of relations, keys, foreign keys
 - one page figure about the relations of the tables (according to how/what we studied)
3. Processing planning
 - steps of use of data tables, updates
 - list of overall/complex queries and statistics (min. 15, preferably with a wide variety, in accordance with data tables and objectives); and description of the way of solution.

Submitted assignment should contain app. 10 pages.

Documentation of the data model (in doc format) should be sent via e-mail to the lecturer's e-mail address.

Homework assignment topics

		Topic	Description
1. Road transport	1	Register of a car retail company	(sales and purchase)
	2	Register of a car warranty service company	(warranty repairs)
	3	Register of compulsory trainings for professional drivers	(mandatory trainings, schedule)
	4	Register of operation of an Auto Club emergency service	(announcement time, arrival, assistance)
	5	Register of an Auto Club membership	(categories, members, payments)
	6	Register of highway traffic restrictions	(for the highway supervision)
	7	Register of a Casco insurance company	(contracts, fees and arrears)
	8	Register of dispatching data for a company fleet	(manage the drivers and the cars)
	9	Register of the driver performance in a hauler company	(for their schedule and for the accounting)
	10	Register of a car compulsory insurance company	(contracts, damages and bonus-malus classification)
	11	Register of a used car sales company	(the sale process of the cars)
	12	Register of trucks arriving to the depot	(regular and occasional maintenance)
	13	Register of fuel consumption of a depot	(fuelling the own vehicles at the depot)
	14	Register of a truck parking facility	(fees for accounting and calculation of capacity utilization)
	15	Register of a non-free car parking	(vehicles, drivers – if necessary, fees, times)
	16	Register of the orders for a moving company	(data from ordering process and completing)
	17	Register of waybills of a haulier company	(waybills and their processing)
	18	Register of a motorcycle sales company	(sales data for the new and used motors)
	19	Register of data of P+R car park traffic	(traffic count and its analysis)
	20	Register of a rally competition	(calendar, participants, results)
	21	Register of traffic incidents	(penalties, penalty point system)
	22	Register of anomalous parking	(penalties)
	23	Register of charging data of e-vehicles	(vehicles, charging stations)
	24	Register of traffic light failures	(traffic lights, description and response of the failure)
	25	Register of ride-sharing (car-pooling) system	(drivers, passenger and travels)
	26	Register of autonomous vehicle accidents in road transport	(circumstances of the accident, reports, statistics)
2. Rail	1	Register of rail cars in a railway station	(to analyse the traffic of the station)
	2	Register of incidents and failures at interlocking	(to schedule and manage the maintenance)
	3	Register of accidents in railway crossings	(time, accident details)

	4	Register of railway repair activities	(occasional and regular repairs)
	5	Register of the railway wagon order system	(scheduling the use of rail cars)
	6	Recording punctuality at rail passenger transport system	(delays, causes)
	7	Register of an international rail booking system	(seat, passenger, train data)
	8	Register of rail safety critical events (e.g.: red light passing)	(participants, type of the incident)
	9	Register of traffic of railway lines	(the relation between traffic volume and capacity)

3. Air transport	1	Register of catering data in an airport	(data for the catering delivered to the planes)
	2	Register of discounted tickets for employees of an airline company	(free and discounted ticket system)
	3	Register of airport and airspace fees	(for the accounting of the airlines)
	4	Register of refuelling of airplanes	(airlines and flights, accounting)
	5	Register of use of plane standing rooms	(for scheduling and accounting)
	6	Register and statistics of the delays in an airport	(regarding to one airport, indicating the reason)
	7	Register of the usage of the check-in counters	(ensure the resources, accounting with service providers)
	8	Register of the passenger flows in an airport	(check boarding passes at certain points – UB, duty-free, boarding gates – record timestamp, passenger data)
	9	Register of a package delivery system in an airport	(passenger-luggage are carried separately to and from the airport, service orders)
	10	Register of airspace violations	(flights, causes, statistics)
	11	Register of use of the airspace	(airspace and flights)
	12	Register of the schedule of the cabin crew	(persons, groups assigned to flights, labour regulations)
	13	Register of the accidents in air transport	(circumstances of the accident)
	14	Flight utilisation of an airline	(popular destinations, free capacity)

4. Water transport	1	Register of sailboats at lake Balaton	(ships according to categories and docks)
	2	Register of marine cargo ships	(fleet tracking and crew scheduling)
	3	Register of shipping routes	(in kms for traffic planning and control)
	4	Register of a charter boat company	(unscheduled trips, events)
	5	Register of cargo bay for line-shipping	(transport on ships with fix route)

5. Urban	1	Register of buses in the depot	(buses to and from the depot and their control)
	2	Register of the working hours for the bus drivers	(working hours for the bus drivers according to shifts and dates)
	3	Register of supplementary fees and penalties	(monitoring the penalties and the inspectors' work)
	4	Register of roadblocks in a city	(useful information for the media)

	5	Register of trams in the depot	(technical conditions and maintenance)
	6	Recording and analysis of daily activity chains	(types of activities, spatial and temporal characteristics, user data, costs of activities)
	7	Register of passenger passes at a station with gates	(record the different types of passes and tickets too)
	8	Register of a similar bike rental system like the MOL BUBI	(bicycles, stations and rentals)
	9	Register of bicycle accidents in densely populated areas	(circumstances of the accident, reports, statistics)
	10	Register of a car-sharing system	(vehicles, stations, users, booking)
	11	Register of an e-ticketing system	(ticket types, users, travels)
	12	Register of a Bookroad system – reservation system for the roadway	(road attributes, users, booking)
	13	Register of roadside parkings	(parking, users, booking)
	14	Register of a DRT system (Demand Responsive Transport)	(vehicles, passengers, booking)
	15	Register of a taxi service	(vehicles, passengers, booking)
	16	Register of a chauffeur-service company system	(drivers, vehicles, users, travels)
	17	Register of the timetable in an urban transportation system	(relations, routes, runs, vehicles)
	18	Register of unplanned service cancellation in public transport	(e.g. a bus brakes down during the service)
	19	Charging optimisation of electric vehicles connected to smart grid with smart distribution of free capacity	(which vehicle, when and at what rate of charge)

6. Other	1	Register of a parts store	(to calculate capacities and stored volumes)
	2	Register of a warehouse with contract storage	(monitoring of processes for accounting and statistics)
	3	Register of a parcel service	(orders and delivers of a company)
	4	Register of an express mail service	(follow up the mails)
	5	Register of a container rental company	(available containers, dispatching and billing)
	6	Register of a forklifts dealer company	(types, forklifts, buyers)
	7	Register of a manufacturing plant	(orders of certain products for manufacturing planning)
	8	Register of noise measurements	(data measured in different locations)
	9	Register of air pollution measurements performed by vehicles	(results and their evaluations)
	10	Register of a NGO (non-governmental organization) membership	(data from the members, fees, posts)
	11	Register of deliveries of a logistics company	(record the sender, addressee and the delivery status of the shipment)
	12	Register of ice cream distribution	(plan the journeys, check the deadlines, support billing)